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United States Department of Agriculture,

DIVISION OF BOTANY.

RED CLOVER SEED.

The great advance in the price of red clover seed, and the possibility that a still greater advance may take place this spring, makes it desirable that the attention of farmers should be called to the necessity of purchasing good seed, even if a high price must be paid. Low-priced seed is frequently poor, and poor seed is nearly always the most expensive in the end. When, for any reason, there has been an unusual increase in the price of all grades of clover seed there is certain to be

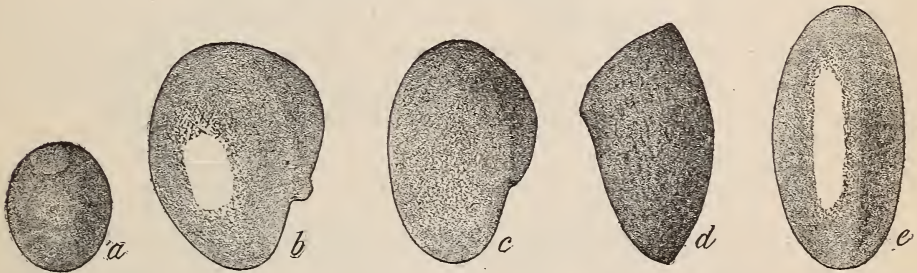


FIG. 1.—Red clover seed and a few of its impurities: *a*, dodder (*Cuscuta arvensis*); *b*, yellow trefoil (*Medicago lupulina*); *c*, red clover (*Trifolium pratense*); *d*, broad-leaved plantain (*Plantago rugelii*); *e*, buckhorn (*Plantago lanceolata*).

much complaint about the advanced prices, and dealers are often tempted to meet the demand for cheap seeds, some by offering old stock, some by offering poorly cleaned seed, while others freely adulterate high-grade lots with screenings or other adulterants, in order to lessen the cost of the seed to themselves.

POINTS OF QUALITY.

The quality of a sample of clover seed depends upon its cleanness, the percentage of germinable seed, the vigor of germination, and the origin of the seed. The cleanness of a sample depends both upon its freedom from broken seeds, dirt, and other inert matter and upon the absence of weed seeds and the seeds of other cultivated plants. The seeds of timothy, white, and alsike clover are often present, and although they must be considered impurities, they can not be called injurious. Tim-

othy may sometimes be present in such quantity as to be objectionable, not from the nature of the plant, but because the seed can be purchased at a much less cost than clover seed, and a farmer does not want to pay for clover when he gets timothy. More serious is the presence of a considerable quantity of weed seeds, especially if among the lot are the seeds of some of the more dangerous weeds. The accompanying illustration (fig. 1) shows the appearance of red clover seed and of some of its principal adulterants under a low-power magnifying glass.

In some localities low grades of clover seed are demanded because the clover is to be used as green manure, and it is thought that the weeds will furnish green material for plowing under and can thus do no harm. This is true to a certain extent, but the weeds fall far short of the clover as green manure, and the value of the sod will be reduced in proportion to the abundance of weeds.

It is poor economy to pay for weed seeds and to allow them to occupy the ground at a saving of 25 to 50 cents on the acre for seed. Moreover, when a sample of clover seed is very foul, it nearly always contains large quantities of the seeds of the worst weeds, such as sorrel, buckhorn, plantain, and sometimes dodder. The seeds of dodder are, fortunately, not yet common in American clover seed, and are rare in well-cleaned, home-grown seed, but the danger of the spread of this pest should not be underrated. When it is realized that a dodder plant can attack one clover plant after another until it has destroyed the clover over an area of several square feet, it will be seen that not even one dodder seed in a pound of clover seed should be tolerated.

ADULTERANTS.

The most frequent adulterant, besides screenings and dead seeds, is the seed of yellow trefoil. The seed of this plant is much cheaper than that of red clover, and a few years ago immense quantities were imported into this country. Most of this was undoubtedly used to adulterate clover seed, as the legitimate demand for trefoil is insignificant, and the plant is positively objectionable in red clover fields. So far this year, this seed has not been found in the samples of red clover examined at the Department of Agriculture, but it will be well for buyers to be on the lookout for it. The seed so closely resembles that of red clover that as much as 30 per cent can be mixed with the latter without being detected on casual examination. It is greenish yellow in color, and is distinguished by a minute projection in the neighborhood of the scar that marks the point of attachment of the seed in the fruit.

GERMINATION OF CLOVER SEED.

Low-grade seed usually contains a large amount of brown, dead seeds. These reduce the percentage of germination of the sample and consequently reduce its value. In order to use the right amount of seed

for a good catch of clover it is necessary to know how much of the seed will grow. When 15 pounds are sown on an acre and only one-half of the seed sprouts, it is equivalent to using only $7\frac{1}{2}$ pounds of good seed and a correspondingly poor stand is inevitable. Not only should the percentage of germination be known, but the seed should germinate vigorously. Slow germination usually indicates weak seed, and such seed will produce weak plants. These seeds are generally light and are blown out in well-cleaned samples, but may be present in large amounts in low grades.

ORIGIN OF THE SEED.

The origin of the seed is of much importance, but it has been almost entirely ignored in this country. It is impossible to do more than refer to the matter at this time, and to state that, as a general rule, seed grown in northern latitudes will produce hardier plants than seed grown in the South.

TESTING CLOVER SEED.

The color and shape of red clover seed are so well known that a description is not necessary. Fresh seed is generally bright and plump

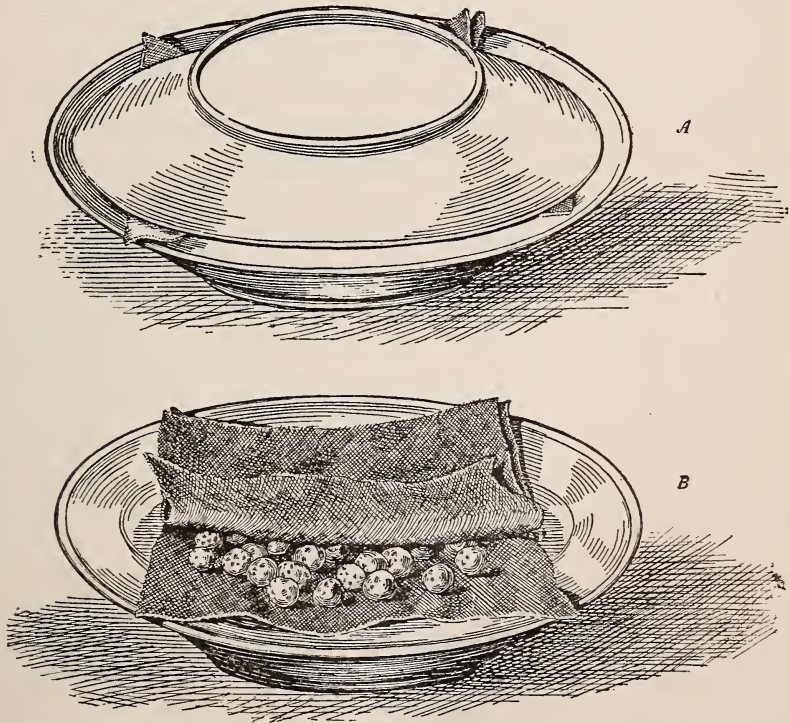


FIG. 2.—Simple germinating apparatus: A, closed; B, open.

in appearance and such is most valuable. Samples that have a large admixture of dull, dark-brown seeds should be looked upon with suspicion and not used unless testing shows them to be good.

It is not a difficult matter for anyone to test his clover seed for ger-

mination. A good germinator can be made with two dinner plates and a folded piece of flannel cloth (Fig. 2). The seeds should be placed between the folds of the dampened cloth, which is then laid on one plate while the second plate is inverted over the first. When tests are made during the winter, the plates should be put in a warm place so that the temperature will not fall much below 50° at night and 60° to 70° during the day. Any other apparatus that will keep the seeds moist and warm while admitting air will serve equally well, or the seeds may be planted in a flowerpot or pan of earth. The sprouts should be counted and removed from day to day until the conclusion of the test. If the seed is good and the conditions are right, red clover should begin sprouting vigorously the second or third day and in four or five days nearly all the good seeds will have germinated. A few will come on later, and seed-testing establishments generally allow ten days as the limit for red clover. In case many seeds remain hard at the end of ten days it is fair to consider that one-third of them would grow after a reasonable time in the field.

BEST SEED TO BUY.

The prices charged for clover seed vary greatly, each large dealer having two or more grades, of different prices. Unfortunately for the buyer, each dealer has his own grade names, and even the standard terms, prime, choice, and fancy, as used by different dealers, do not always mean the same thing. If for these indefinite terms could be substituted a statement of the percentage of pure and germinable seed, the buyer could tell at once what sample was the most advantageous for him to buy. It is a safe general conclusion that the sample which, while reasonably free from weed seeds, contains the largest amount of pure and vigorously germinating clover at the least cost is the best one for the farmer to buy. Low-priced samples seldom fulfill this condition, nor do those sold at exorbitantly high prices. Usually the high grade, medium-priced samples are really the cheapest, but the only way to determine the value of a sample is to test the seed. The result of the purity test shows how much pure seed is present and the germination test determines how much of this pure seed will grow.

RESULTS OF SOME TESTS.

Last fall, as previously, a large number of tests were made of seed offered by wholesale dealers. A few of these tests are given below to show that at present there is no close agreement between selling price and quality. The examples given have been divided into three groups, according to the market price of the seed. In the first group are the low-priced samples, below \$4.50 per bushel; in the second group, those of medium price, between \$4.50 and \$5; in the third group, the high-priced lots, \$6 or more. The three examples in each group are arranged

in the order of the price really paid for a bushel of good seed. This may be called the calculated price. Of course, commercial seed never contains 100 per cent of pure and germinable seed, but this ideal standard is used as a measure of the real value of different qualities sold at different prices. The average number of weed seeds per pound of seed as sold is also given. In determining the number of weed seeds only seeds of such plants as are commonly considered weeds were counted. Seeds of wild plants occasionally found in clover fields were left out. In comparing the market and calculated prices the number of weed seeds in some of the low-priced lots should not be overlooked. No. 9368 while showing the lowest calculated price, because of its extremely low market price, contains a large number of weed seeds and the germination of this sample was not vigorous. The quality of the high-priced samples was good, but the prices were much higher than the condition of the market would justify. For his own protection the farmer should ask for a statement of the percentage of pure and germinable seed in any lot he buys. The seedsman can readily ascertain this percentage and the buyer can verify the statement by sending a sample either to his State experiment station or to the United States Department of Agriculture.

Results of tests of red clover seed.

Test number.	Market price per bushel.	Per cent of pure and germinable seed.	Calculated price per bushel.	Number pounds good seed per bushel.	Number weed seeds per pound.
9368	3.00	63.21	4.74	37.92	20,928 ^a
9328	4.20	77.73	5.40	46.63	5,000
9327	3.45	53.26	6.48	31.95	27,000 ^b
9271	4.98	93.83	5.28	56.29	700
9276	4.80	83.66	5.73	50.19	4,600
9305	4.80	64.89	7.39	38.92	27,700
9461	6.00	95.80	6.24	57.48	1,540
9303	6.00	88.03	6.78	52.81	360
9463	7.20	80.10	9.00	48.00	226

^a Weed seeds, mostly green foxtail.

^b Mostly green foxtail and plantain.

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